AMENDMENTS IN THE CLAIMS

Claims 1-18 (cancelled).

19. (Original) A computer mediated control system for use in a force feedback system, said force feedback system including at least one actuator and at least one position sensor, said control system comprising:

a memory storing at least one force feedback effect, said at least one force feedback effect providing forces to be output to a user of said force feedback system; and

a computer mediated controller coupled to said at least one actuator and to said at least one position sensor, wherein said computer mediated controller

receives input information through a communication port of said computer mediated controller and decodes commands from said input information,

reads force values from said communication port,

outputs output data on said communication port, said output data including position data from said at least one position sensor,

determines at least one installed force feedback effect to contribute to output of said force feedback system,

processes said stored force feedback effect to determine a force contribution from said force feedback effect, and

outputs a force feedback value based on said determined force contribution to cause a force based on said force feedback value to be output by said actuator to the user of said force feedback system.

20. (Original) A computer mediated control system as recited in claim 19, wherein said force feedback effect is one of a detent effect, a wall effect, and a spring effect.

21. (Original) A computer mediated control system as recited in claim 19, wherein said force feedback effect includes at least one parameter, and wherein said at least one parameter is at least one of a stiffness parameter, a damping parameter, a force parameter, and a distance parameter.

22. (Original) A computer mediated control system as recited in claim 19, wherein said force feedback value is a result of summing force contributions from a plurality of installed force feedback effects.

23. (Previously amended) A computer mediated control system as recited in claim 19, wherein pointers are provided by a user of said force feedback system to install desired force feedback effects to contribute to said output force feedback value.

24. (Previously amended) A computer mediated control system as recited in claim 19, further comprising computing velocity from said position data received from said at least one position sensor and using said velocity in said determination of said force contribution.

25. (Previously amended) A computer mediated control system as recited in claim 19, wherein said force feedback effect contributes to said output force feedback value as a result of a user manipulatable member being moved by a user to enter a boundary of said force feedback effect as determined by said position data.

26. (Previously amended) A computer mediated control system as recited in claim 25, wherein said output data includes button press data from at least one button provided on said user manipulatable member of said force feedback system.

27. (Previously amended) A force feedback device, comprising:

a user manipulatable member having at least one degree of freedom of motion and being manipulatable by a user physically contacting said member;

at least one actuator outputting forces to said user;

at least one position sensor for determining a position of said user manipulatable member in said at least one degree of freedom; and

a computer mediated controller coupled to said actuator and to said at least one position sensor, wherein said controller

receives input information through a communication port of said computer mediated controller and decodes commands from said input information,

reads force values from said communication port,

outputs output data on said communication port, said output data including position data from said position sensor,

determines at least one installed force feedback effect to contribute to output of said force feedback system,

processes said installed force feedback effect to determine a force contribution from said installed force feedback effect, and

outputs a force feedback value based on said determined force contribution to cause a force based on said force feedback value to be output by said actuator to the user of said force feedback system.

28. (Original) A force feedback device as recited in claim 27, wherein said user manipulatable member is a joystick.

29. (Original) A force feedback device as recited in claim 27, further comprising a deadman switch for disabling said output forces when said user is not manipulating said member.

30. (Previously Amended) A force feedback device as recited in claim 27, further comprising a gear transmission provided between said member and said plurality of actuators, said gear transmission transmitting said output forces from said actuators to said member.

31. (Previously Amended) A force feedback device as recited in claim 27, wherein a memory is accessible to said controller.

32. (Original) A force feedback device as recited in claim 31, wherein said memory is non-volatile memory.

33. (Original) A force feedback device as recited in claim 27, wherein said force feedback effects include at least one of a detent, a wall, and a spring.

34. (Original) A force feedback device as recited in claim 27, wherein each of said force feedback effects includes at least one parameter, and wherein said at least one parameter is at least one of a stiffness parameter, a damping parameter, a force parameter, and a distance parameter.

35. (Original) A method for providing output force from an actuator in a force feedback device, the method comprising:

outputting a maximum peak force from an actuator on a user manipulatable object of said force feedback device, wherein a user can manipulate said user manipulatable object in a degree of freedom, and wherein said maximum peak force is related to a maximum power that said actuator can utilize instantaneously; and

reducing said output of said maximum peak force to an output of a nominal peak force from said actuator when said power utilized by said actuator exceeds an average power level over a predetermined period of time, wherein said nominal peak force is related to a maximum power that said actuator can utilize in continuous steady-state operation.

36. (Original) A method as recited in claim 35, wherein said maximum peak force is output only when said user initially moves said user manipulatable object into an object simulated by a computer system.

37. (Original) A method as recited in claim 35, wherein said maximum peak force has about twice as great a magnitude as said nominal peak force.

38. (Original) A method as recited in claim 35, wherein said nominal peak force is associated with an average current during operation of said actuator.

39. (Original) A method as recited in claim 35, further comprising monitoring average power requirements of said actuator over time to determine when said power utilized by said actuator exceeds said average power level over said predetermined period of time.

40. (Original) A method as recited in claim 35, wherein said predetermined period of time is about two seconds.

41. (Original) A force feedback device that interfaces with a computer graphical simulation, said force feedback device comprising:

a user manipulatable object moveable by a user in at least one degree of freedom;

at least one sensor that detects a position or motion of said user manipulatable object in the at least one degree of freedom; and

at least one actuator outputting a force on the user manipulatable object, the at least one actuator outputting a maximum peak force on the user manipulatable object,

wherein the peak force is related to a maximum power that the at least one actuator can utilize instantaneously, and wherein the maximum peak force is reduced to a nominal peak force by the actuator when the power utilized by the actuator exceeds an average power level over a predetermined period of time, wherein the nominal peak force is related to a maximum power that the actuator can utilize in continuous steady-state operation.

42. (Original) A force feedback device as recited in claim 41, wherein the maximum peak force is output only when the user initially moves the user manipulatable object into an object simulated in the computer graphical simulation.

43. (Original) A force feedback device as recited in claim 41, wherein the maximum peak force has about twice as great a magnitude as the nominal peak force.

44. (Original) A force feedback device as recited in claim 41, wherein the predetermined period of time is about two seconds.

45. (Original) A force feedback device as recited in claim 41, wherein the user manipulatable object is a joystick.

46. (Previously Amended) A system comprising:

a force-feedback actuator coupled to a manipulandum;

a position sensor coupled to said manipulandum;

a memory comprising a stored force feedback effect; and

a controller coupled to said force-feedback actuator, said position sensor, and said memory, wherein said controller is operable to:

calculate a force feedback effect to contribute to output of said force feedback actuator, wherein said force feedback effect comprises a force feedback effect type and a magnitude.

47. (Previously Added) A system as recited in claim 46, wherein said force feedback effect comprises an effect selected from the group consisting of a detent effect, a wall effect, and a spring effect.

48. (Currently Amended) A system ~~as recited in claim 46~~, comprising:

a force-feedback actuator coupled to a manipulandum;

a position sensor coupled to said manipulandum;

a memory comprising a stored force feedback effect; and

a controller coupled to said force-feedback actuator, said position sensor, and said memory, wherein said controller is operable to:

determine a force feedback effect to contribute to output of said force feedback actuator, wherein said force feedback effect comprises a force feedback effect type and a magnitude, and wherein said force feedback effect comprises an attribute selected from the group consisting of a stiffness attribute, a damping attribute, a force attribute, and a distance attribute.

49. (Previously Amended) A system as recited in claim 73, wherein said memory comprises a plurality of stored force feedback effects and said force feedback value comprises the sum of force contributions from said plurality of stored force feedback effects.

50. (Previously Amended) A system as recited in claim 46, wherein said controller is further operable to utilize a plurality of pointers to determine the force feedback effect to contribute to said output force feedback value.

51. (Previously Amended) A system as recited in claim 46, wherein said controller is further operable to:

compute a manipulandum velocity from said position data; and

incorporate said velocity in said determination of said force contribution.

52. (Previously Added) A system as recited in claim 46, further comprising a stored representation of a boundary, wherein said determination of said force contribution utilizes said stored representation of said boundary and said position data.

53. (Previously Amended) A system as recited in claim 46, further comprising a button coupled to said manipulandum and said controller.

54. (Previously Amended) A device comprising:

a manipulandum having at least one degree of freedom;

an actuator coupled to said manipulandum;

a position sensor for determining a position of said manipulandum in said at least one degree of freedom; and

a controller coupled to said actuator and to said position sensor, wherein said controller is operable to:

determine at least one stored force feedback effect to contribute to output of said force feedback system, wherein said force feedback effect comprises a force feedback effect type and a magnitude.

55. (Previously Added) A device as recited in claim 54, wherein said manipulandum comprises a joystick.

56. (Currently Amended) A device ~~as recited in claim 54, further~~ comprising:

a manipulandum having at least one degree of freedom;

an actuator coupled to said manipulandum;

a position sensor for determining a position of said manipulandum in said at least one degree of freedom;

a controller coupled to said actuator and to said position sensor, wherein said controller is operable to:

determine at least one stored force feedback effect to contribute to output of said force feedback system, wherein said force feedback effect comprises a force feedback effect type and a magnitude, and

a deadman switch for disabling said output forces.

57. (Previously Amended) A device as recited in claim 54, further comprising a gear transmission coupled between said manipulandum and said actuator, said gear transmission configured to transmit an output force from said actuator to said manipulandum.

58. (Previously Added) A device as recited in claim 54, further comprising a memory coupled to said computer-mediated controller.

59. (Previously Added) A device as recited in claim 58, wherein said memory comprises non-volatile memory.

60. (Previously Amended) A device as recited in claim 54, wherein said stored force feedback effect comprises at least one of a detent, a wall, and a spring.

61 (Currently Amended) A device ~~as recited in claim 54~~, comprising:

a manipulandum having at least one degree of freedom;

an actuator coupled to said manipulandum;

a position sensor for determining a position of said manipulandum in said at least one degree of freedom; and

a controller coupled to said actuator and to said position sensor, wherein said controller is operable to:

determine at least one stored force feedback effect to contribute to output of said force feedback system, wherein said force feedback effect comprises a force feedback effect type and a magnitude, and wherein said force feedback effect comprises an attribute~~, wherein said attribute comprises an attribute~~ selected from group consisting of a stiffness attribute, a damping attribute, a force attribute, and a distance attribute.

62. (Previously Added) A method for providing haptic feedback, comprising:

outputting a maximum peak force from an actuator to a manipulandum of a force feedback device, wherein said manipulandum comprises at least one degree of freedom, and wherein said maximum peak force is related to a maximum power that said actuator can utilize instantaneously; and

reducing said output of said maximum peak force to an output of a nominal peak force from said actuator when said power utilized by said actuator exceeds an average power level over a predetermined period of time, wherein said nominal peak force is related to a maximum power that said actuator can utilize in continuous steady-state operation.

63. (Previously Added) A method as recited in claim 62, wherein said maximum peak force is output only during an initial movement of said manipulandum corresponding to entry into an object simulated by a computer system.

64. (Previously Amended) A method as recited in claim 62, wherein said maximum peak force comprises about twice as great a magnitude as said nominal peak force.

65. (Previously Added) A method as recited in claim 62, wherein said nominal peak force is associated with an average current during operation of said actuator.

66. (Previously Added) A method as recited in claim 62, further comprising monitoring average power requirements of said actuator over time to determine when said power utilized by said actuator exceeds said average power level over said predetermined period of time.

67. (Previously Added) A method as recited in claim 62, wherein said predetermined period of time comprises about two seconds.

68. (Previously Added) A device comprising:

a manipulandum moveable in at least one degree of freedom;

a position sensor coupled to said manipulandum, said position sensor operable to detect a position of said manipulandum at least one degree of freedom; and

an actuator coupled to said manipulandum, said actuator operable to output a maximum peak force on said manipulandum,

wherein said maximum peak force is related to a maximum power that said actuator can utilize instantaneously, and wherein said maximum peak force is reduced to a nominal peak force by said actuator when the power utilized by the actuator exceeds an average power level over a predetermined period of time, and wherein a nominal peak force is related to a maximum power that said actuator can utilize in continuous steady-state operation.

69. (Previously Amended) A device as recited in claim 68, wherein said maximum peak force is output only during an initial movement of said manipulandum into an object simulated in the computer graphical simulation.

70. (Previously Added) A device as recited in claim 68, wherein said maximum peak force has about twice as great a magnitude as said nominal peak force.

71. (Previously Added) A device as recited in claim 68, wherein said predetermined period of time comprises about two seconds.

72. (Previously Amended) A device as recited in claim 68, wherein said manipulandum comprises a joystick.

73. (Previously Added) A system as recited in claim 46, wherein said controller is further operable to output a force feedback value based on said determined force contribution to said force feedback actuator.

74. (Previously Added) A system as recited in claim 46, wherein said controller is further operable to:

receive input information through a communication port of said controller and decodes commands from said input information,

read force values from said communication port, and

output data on said communication port, said output data including position data from said position sensor.

75. (Previously Added) A device as recited in claim 54, wherein said controller is further operable to output a force feedback value based on said determined force contribution to cause a force based on said force feedback value to be output by said actuator.

76. (Previously Added) A device as recited in claim 54, wherein said controller is further operable to:

receive input information through a communication port of said controller and decodes commands from said input information,

read force values from said communication port, and

output data on said communication port, said output data including position data from said position sensor.